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New distribution record of *lethocerus patruelis* in the eastern Mediterranean coast, Mersin, Türkiye

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ABSTRACT

According to this study in Mersin, Turkey, *Lethocerus patruelis* has a new distribution record. Field surveys in Erdemli-Akkum and Taşucu-Boğsak bays conducted from May to July 2024 confirmed the occurrence of this species by traditional observation techniques. It is confirmed that *L. patruelis* has adapted to different environments and expanded its known distribution area. This information brings new locality data on the distribution of this species along the eastern Mediterranean coast. Given the possible effects on the marine ecosystem, its Mediterranean distribution must be revised. The study contributes to knowledge about these species' ecological requirements in their adjustment to coastal ecosystems and dynamics of distribution.

Keywords: Giant Water Bug, *Lethocerus patruelis*, Distribution, Expansion, Gulf of Mersin

1. INTRODUCTION

Lethocerus patruelis belongs to the family Belostomatidae of giant water bugs, first described by Stål in 1854. The species is known for its predatory behavior, focusing on vertebrates such as frogs (Christopoulos et al., 2022). Several species in the aquatic insect family Belostomatidae have distinctive characteristics that enable them to withstand harsh conditions like low oxygen levels, shifting water temperatures, flooding, and pollution (Ohba, 2019). The giant water bug species *L. patruelis* has a wide geographic distribution. *L. patruelis* occurs in the Oriental region, which includes Pakistan, India, Nepal, and Burma, as well as the Balkan Peninsula, Anatolia, Israel, Syria, Saudi Arabia, Yemen, United Arab Emirates, Kuwait, Iraq, Iran, and Afghanistan (Grozeva et al., 2013).

Based on several recent records, it has also been reported to occur in Italy (Lo-Parrino, 2019). The only European belostomatid species, *L. patruelis*, is distributed in several European countries, including Serbia, the Republic of North Macedonia, Montenegro, Greece, Albania, Bulgaria, and Croatia Davranoglou and Karaouzas, (2021), and has also been recorded in Rhodes, Eastern Mediterranean, as reported by (Corsini-Foka et al., 2019). Hadjiconstantis et al., (2023) recorded the species from the

island of Cyprus, closest to the coast of Mersin, where we collected specimens. These observations show the broad adaptability of the species to different environments and habitats throughout its geographic range.

The detection of individuals of *L. patruelis* along marine shorelines, as in this study, enriches our understanding of the species' adaptability and ecological preferences (Guo et al., 2004). This addition highlights the importance of continued monitoring and research to uncover additional distribution patterns and ecological dynamics of *L. patruelis* (Grozeva et al., 2013). Such knowledge will be invaluable in developing conservation and management strategies for this species to ensure its survival under changing environmental conditions.

2. MATERIAL METHODS

After diving in Mersin-Akkum Bay, we accidentally found an individual of the species in the coastal zone in May 2024. To see more individuals of *L. patruelis*, we conducted field surveys in Erdemli-Akkum and Taşucu-Boğsak bays between May and July 2024 to confirm its distribution and presence on the Mersin coast. Then, in June 2024, we found the second individual of the species on the beach in Taşucu-Boğsak Bay, which we had never encountered before despite the extensive studies we had previously conducted on the Mersin coast. We collected one individual each from the bays of Erdemli-Akkum and Taşucu-Boğsak.

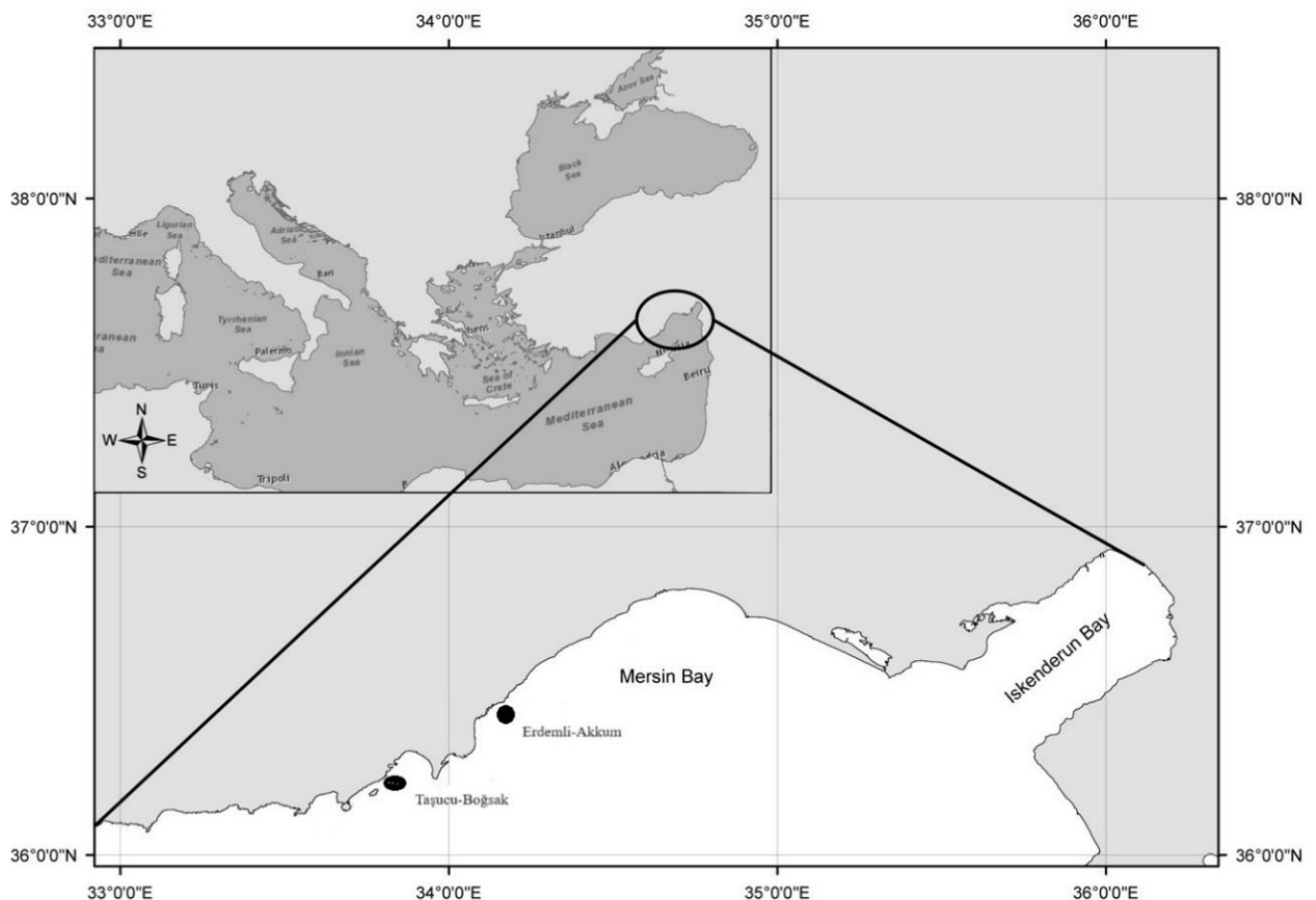


Figure 1 Locations where specimens of the *L. patruelis* species were collected in Mersin Bay

In Figure 1, the locations of the bays of Erdemli-Akkum and Taşucu-Boğsak, where individuals of the species were collected, are shown on the map. The specimens were registered at the Marine Life Museum of Mersin University with the catalog number MEUHC-24-11-001 and preserved in ethanol (Figure 2). The collected specimens were identified by examining morphological characteristics and genital plates based on the work of (Novoselsky et al., 2018).



Figure 2 a) Dorsal view of a male individual, b) Abdominal view of a male individual, c) Genital plate of a male individual.

3. RESULTS AND DISCUSSIONS

The body length of the individual from Erdemli-Akkum beach was 62.57 mm, while the size of the individual from Taşucu-Boğsak beach was 62.38 mm. According to Novoselsky et al., (2018), the sex of the individuals was determined, and both specimens obtained in the present study were male. Determining the occurrence of *L. patruelis* in Türkiye-Mersin extends the knowledge of the distribution expansion of the species and shows its adaptability to further potential range shifts. This new record is essential to advancing our knowledge of the species' ecological needs and potential distribution drivers. However, reports of *L. patruelis* have been made from various environments, including the more arid parts of the Middle East, South Asia, and Mersin, as well as the freshwaters of southeast Europe. This flexibility in habitat use allows the species to occupy various ecological niches, reflecting coherent environmental plasticity.

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Author Contribution

DA: Drafted and revised the manuscript, reviewed and edited the text, provided critical feedback, and contributed to the experimentation and organization of the research.

AU: Provided critical feedback, reviewed and edited the text, contributed to the experimentation and organization, and revised the final version for publication.

Informed consent

Not applicable.

Conflicts of interests:

The authors declare that there are no conflicts of interests.

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Ethical approval & declaration

In this article, as per the animal regulations followed in Middle East Technical University, Institute of Marine Sciences, Mersin, Türkiye, the authors observed the new distribution record of *lethocerus patruelis* in the eastern Mediterranean coast (Erdemli-Akkum and Taşucu-Boğsak bays), Mersin, Türkiye. The Animal ethical guidelines are followed in the study for species observation, identification & experimentation.

Data and materials availability

All data associated with this study are present in the paper.

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